Physical Science Chapter 9 Notes

9.1 Carbon based molecules have many structures

* Living and nonliving things contain carbon
	+ Carbon is the most important element for life
* **Organic Compound:** based on carbon. Often contains CHNOPS
* **Inorganic Compound:** typically compounds without carbon
	+ Except diamond, graphite, cyanides, carbon dioxide, and carbonates
* Carbon forms many different compounds
	+ Carbon bonded with Carbon can form either single, double, or triple bonds
		- C-C C=C C=-C
	+ Carbon always shares 4 pairs of electrons in 4 covalent bonds
	+ Carbon forms only a single bond with Hydrogen
* Carbon based molecules have different structures
	+ **Carbon chains**
		- Straight Chained: All of the bonds occur in a straight line
			* C-C-C-C-C-C-C-CH-C
		- Branched Chain: additional carbon atoms or chains are bonded to an original straight chain
		- (Draw the picture of a branched chain molecule)
	+ **Carbon Rings**
		- Carbon molecules shaped like a ring, typically contain 5-6 carbon atoms
		- Carbon rings containing more than 20 Carbon atoms do not naturally occur
		- There are different types of ring structures
			* Benzene is the most important because many structures are based off the Benzene ring
				+ **Aromatic compounds** – based on the Benzene structure have a strong smell

Vanillin

* **Isomers:** compounds that contain the same atoms but in different places
	+ End up with different substances because of the different structures
		- Ex. Butane and Isobutane
		- Ex. Retinol in eyes becomes and isomer when hit with light = triggers signal to brain = sight

9.2 Carbon-based molecules are life’s building blocks

* Carbon-based molecules have many functions in living things
	+ CHNOPS
	+ Marcomolecules – very large molecules
* Living things contain four major types of carbon-based molecules
	+ **Carbohydrates:** sugars, starches, and cellulose
		- Contain atoms of carbon, hydrogen, and oxygen
		- Two main functions
			* Source of chemical energy for cells in many living things
			* Part of the structural materials of plants
	+ **Lipids**: include fats and oils and are used mainly for energy and as structural materials in living things
		- Most are made of carbon, hydrogen, and oxygen
		- Saturated fats – all atoms form single bonds with each other
		- Unsaturated fats – at least one atom forms a double bond with another
	+ **Proteins**: marcomolecules that are made of smaller molecules called amino acid
		- Contain carbon, hydrogen, and oxygen. Also contain nitrogen, sulfur and other elements
		- Have many different functions
		- 20 amino acids make up all the proteins of the human body
		- Function of the protein depends on structure
		- **Enzyme** – a catalyst for a chemical reaction in living things – increase rate of chemical reaction
	+ **Nucleic Acids**: huge, complex carbon-based molecules that contain the information that cells use to make proteins
		- **DNA**: deoxyribonucleic acid
		- **RNA**: ribonucleic acid

9.3 Carbon-based molecules are in many materials

* Carbon-based compounds from ancient organisms are used to make new materials
	+ **Hydrocarbon** – a compound made of only carbon and hydrogen
* Draw the Carbon Cycle picture in your notes!! Pg. 292
* Polymers contain repeating carbon-based units
	+ **Polymers** – very large carbon-based molecules made of smaller, repeating units
	+ **Monomers** – small repeating units linked together one after another to form a polymer
	+ Properties of a polymer depend on the size and structure of the polymer molecule which depends both on the type of monomers it is made of and how many monomers there are
	+ **Plastic** – a polymer that can be molded or shaped